

Innovations in Corrosion Inspection

Openlabdag CorrosieLABS
7 September 2022

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DEKRA Testing – Inspection - Certification

46.500 employees in 60 countries

 **DEKRA**
global partner
for a **safe, secure**
sustainable world



VEHICLE INSPECTION

Performing periodic and non periodic technical testing, as well as systematic emission tests for all kinds of vehicles.



CLAIMS & EXPERTISE

Delivering automotive and non-automotive claims services, vehicle appraisal and management services as well as loss adjusting for all possible damage.



PRODUCT TESTING

Testing and certifying consumer, industrial, automotive, information, and communication products, as well as medical devices.



INDUSTRIAL INSPECTIONS

Supplying full service for building, facility, machinery, and infrastructure inspections, including material testing & inspection.



CONSULTING

Creating innovative and sustainable safety solutions by combining evidence-based science, cutting-edge technology, and internationally renowned expertise.



AUDITS

Offering audits and certifications according to recognized international, national and standards.



TRAINING

Providing solutions and services in a wide range of training, expert migration, language, integration and education.



TEMP WORK

Supporting solutions and services in a wide range of training, expert migration, consulting, integration and education.



INDUSTRIAL inspection services



Pressure / Welding Equipment Services



Plant Safety Environmental



Construction Control



NDT / Advanced NDT



Lifting Equipment, Cranes, Machinery



Electrical Inspection



Mechanized Inspections



DT Labs & Calibration



Fire Protection & Ventilation Systems



Innovations in Corrosion Inspection

Dissecting the topic

Innovation



Corrosion



Inspection



Examples



Innovation

Co-operate, to beat 30 year benchmark in NDT & Inspection

Actors:

- Science / research labs
- Technology / tools manufacturers
- Product / service providers
- Market / asset owners

Challenges:

- Assessing added value of innovation
- Validation of new method
- Acceptance in regulation

Situation:

- Slow asset lifecycle (> 15y)
- Procurement for efficiency
- Few flawed real-life samples (or data)
- Robotics over methods (faster horse)



Corrosion

The problem is **localized**, yet vast

General corrosion vs. localized corrosion, pitting, ...

Atmospheric corrosion still hard to predict.

Obscured external corrosion

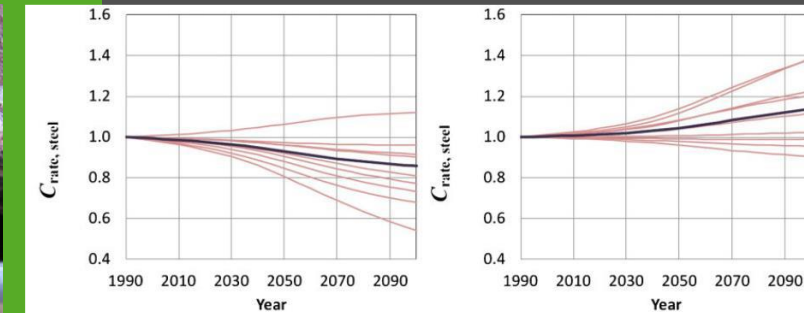
- CUPS (supports)
- CUI (insulation)
- CUFP (fire-proofing)

Hard-to-access areas

- Scaffolding, rope access, cherry picker
- Buried
- Offshore

Changes in design, operation and environment

- Climate change
 - Changes in humidity
 - More wind => more contaminants
 - More rain => more washing



Inspection

More and more **options** emerge

Planning

- Compliance to regulation
- Maintenance planning
- Shift from shutdown to in-service / non-intrusive
- RBI input and evergreening

Assumption verification

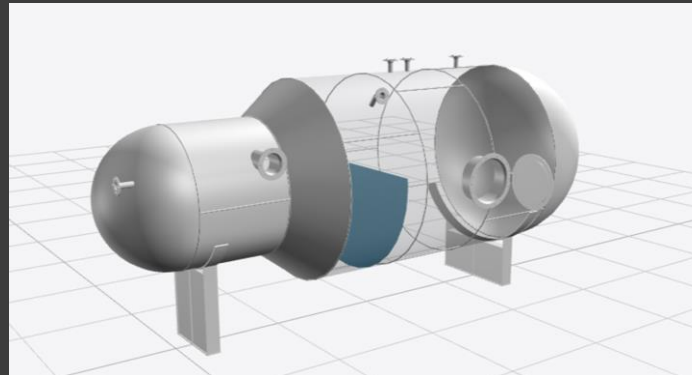
- CML evaluation
- Risk assessment (dynamic risk register)
- Root cause analysis (asset integrity management)

Data collection

- Screening/detection and are coverage
- Productivity, getting more, and more detailed, data

Data handling

- ERP/EAM/IMS, data formats and visualizations
- Advanced analytics for simple predictions
- Some automated defect recognition / AI
- Digital Twins for planning and Augmented Reality



On-stream

Keep equipment in service

Inspections while keeping the equipment in operation

Minimize removal of insulation

Screening to find areas for closer follow-up, or

Detailed Fitness-For-Service calculation

Guided Wave Pipeline Inspection

- Excellent training and oversight

Pulsed Eddy Current Array

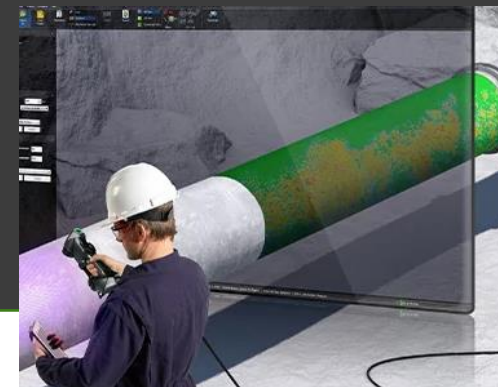
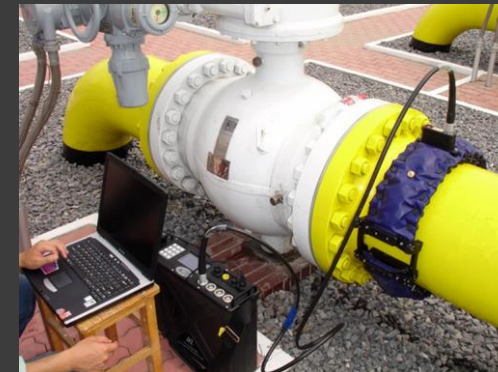
- Productivity increase

3D laserscan with FFS

- Simplified for large scale application

QSR-1 semi-automated CUPS

- Advanced algorithms addressing complex signals



Inside

Going in for a closer view



Going inside the asset, in the medium

Detailed inspection results inachievable from outside

Avoid accessibility issues or cleaning cost and delay

Inline Pipeline Inspection

- Detailed and reliable data
- Operationalized for smaller deployment

SmartBalls

- Low cost leakage localization
- Sensor ball that goes with the flow

Cameras for confined spaces

- Avoid human entry
- Operation in explosive environment

In-service Tankfloor Inspection

- Tanks remain filled and in operation

Robotized

Productivity & coverage (m² per manday)

Mechanized sensor positioning and movement

Originating from Nuclear Power Plants (1960s -) and pipeline girth weld inspection

Crawlers

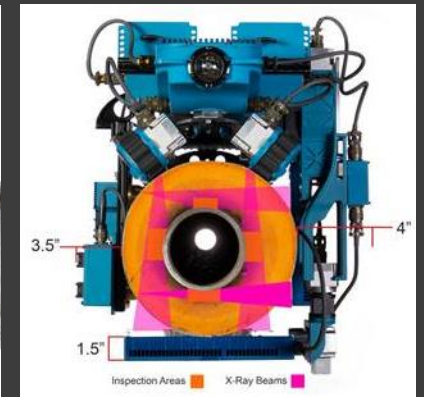
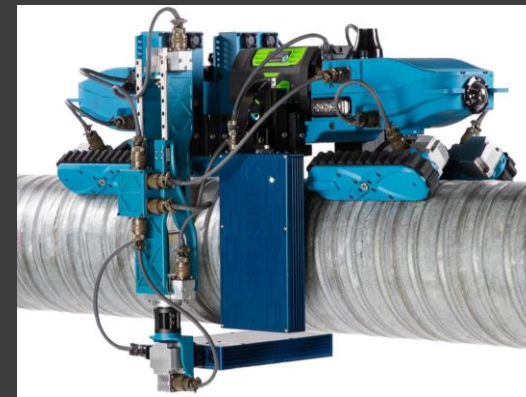
- RealTime Radiography for CUI
- Magnetic wheels, vacuum or normal traction

PAUT C-scan corrosion mapping

- Significant time reduction
- Enhanced resolution

Drones

- Visual / Photogrammetry / LiDAR / Digital Twins
- AI interpretation (corrosion areas / paint / graffiti)



Monitoring

Changes over time



Localized and frequent data

Unsurpassed remaining service life accuracy

Immediate insight in changes

UT wall thickness

- Known measurement principle
- Keeping a close eye on high risk locations

Corrosion Under Insulation - humidity

- Early warning on the conditions for CUI

Inductosense

- Fixed location, RFID sticker
- Not-connected, yet fool-proof

Concluding Remarks



Innovation Cooperation

Science, Technology, Product and **Market** insights are needed to get innovation going.



Corrosion Localization

Inspection **Coverage** should help to find the localized yet hazardous corrosion areas. **Hard-to-access** areas definitely are part of this challenge because of their tendency to hold contaminants and humidity.



Inspection Planning

Many options are available, more **data and insight** can be gathered and in **various ways**. The interpretation requires standardization and referencing.



Simplicity Selection

Ultimate success of innovations depends on **utilization**. **Competence management** is becoming evermore crucial. A new **layer of abstraction** for inspection planning could help.